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Pesticide Fact Sheet Number 195: Bendiocarb

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16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the the following actions has occurred:

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document;
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, science findings.

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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(See ANSI-Z39.18) See Instructions on Reverse OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

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Office of Pesticide Programs (TS-766C)
Washington, DC 20460

540/FS-88-123

EPA

Pesticide Fact Sheet

Name of Chemical: BENDIOCARB
Reason for Issuance: REGISTRATION STANDARD
Date Issued: JUNE, 1987
Fact Sheet Number: 195

1. Description of chemical

Common Name: Bendiocarb
Chemical Name: 2,2-dimethyl-1,3-benzodioxol-4-yl methylcarbamate
CAS Number: 22781-23-3
EPA Shaughnessy Code: 105201
Trade names: Dycarb, Ficam, Garvox, Multamat, NC6897 Niomil, Seedox, Tatoo, and Turcam
Pesticide type: Insecticide
Chemical family: Carbamate
Basic Registrant: NOR-AM Corporation

2. Use Patterns and Formulations

Pests Controlled: Household pests, mosquitoes, ornamental pests, and imported fire ants.

Application Sites: Household, commercial buildings, outdoor mosquito control, greenhouse, ornamentals, aquatic nonfood (sewers), rodent burrows, wood and wood structure protection, fire ant mounds and food handling areas.

Formulation Types: Dust, Wettable Powder, Ready to Use Solution, Granular, Soluble Concentrate Liquid, Shelf Paper.

Application Methods: Broadcast, Foliar Application, Dusting, Crack and Crevice, Soil Drench, and Premise Treatment.

Of the total amount of bendiocarb applied in the United States in 1983-1985, ~71% was used in professional applications to household, commercial, and structural sites, ~14% was used on ornamentals (including turf), ~12% was used on domestic indoor and outdoor sites, and ~3% was used for mosquito control. Application rates range from 1.52-32 oz ai/100 gal, 1-4 lb ai/A, 0.005-0.01 oz ai/burrow for rodent burrows, 0.0067-0.0133 oz ai/mound for fire ant mounds, 0.0026-0.011 lb/ai/A for mosquito control, and 0.07-0.14 oz ai/manhole for use in sewers. Bendiocarb may be formulated with petroleum distillates, piperonyl butoxide, and pyrethrins.

Single active ingredieht formulations consist of 0.5 and 1.0% Dusts, 2.5 and 5.0% Granulars, 20 and 76% Wettable Powders, 1% Wetttable Powders/Dusts, 0.03175, 0.38 and 0.45% Impregnated Shelf Paper, 2.64 lb/gal Flowable Concentrates, 1.67 and 2 lb/gal Soluble Concentrates/Liquids, and 1.5 and 2 lb/gal Ready To Use, Bendiocarb is generally applied by broadcast or directed spray using ground equipment. Application of the 5% Granulars, 76% Wettable Powders, 2.64 lb/gal Flowable Concentrates, the 1.67 and 2 lb/gal Soluble Concentrates/Liquids, and the 1.5 and 2 lb/gal Ready To Use formulations is recommended for use by Pest Control Operators only.

3. Science Findings

Chemical Characteristics

Color: White (Crystalline)
Odor: Odorless to very slight odor
Melting point: 129-130 C
Bulk Density: 0.52 g/ml (loose), 0.62 g/ml (compacted),
Vapor Pressure: 5.0×10^{-6} mm Hg at 25°C
Stability: Chemically stable during 16 months storage at 40°C in sealed containers. No thermal breakdown at temperatures of up to 100°C
Solubility: Very slightly soluble in water and kerosene, highly soluble in nonpolar organic solvents.

Toxicology Characteristics

Acute oral (rats): 45-48 mg/kg (male) (Toxicity Category I)
34-40 mg/kg (female)
Acute dermal (rats): 566 mg/kg (Toxicity Category II)
Acute inhalation: Data not available
Primary eye irritation: Slight (Toxicity Category III)
Primary skin irritation: Mild (Toxicity Category III)
Skin sensitization: Not a skin sensitizer

Subchronic oral: No Observed Effect Level (NOEL) = 0.5 mg/kg/day for cholinesterase inhibition
Subchronic dermal: NOEL = 50 mg/kg/day for 80W formulated product

Chronic effects: Rat: NOEL = 0.5 mg/kg/day; effects noted were cholinesterase inhibition and increased lenticular opacity
Dog: NOEL = 2.5 mg/kg/day; cholinesterase inhibition was the only effect noted
Oncogenicity: No evidence of oncogenic effects
Teratogenicity: Not a teratogen
Reproductive effects: Does not exhibit reproductive effects
Mutagenicity: Data not available

Physiological and Biochemical Characteristics

Metabolism: Bendiocarb is rapidly absorbed from the intestine and excreted primarily in urine. Little excretion occurs via the feces. The principal metabolite is the hydrolysis product of bendiocarb (NC-7312). Bendiocarb was not stored in organ tissues.

Dermal absorption: 53-64% on occluded skin in humans
8-16% on non-occluded skin in humans

Environmental Characteristics

Data are generally not available to evaluate the environmental fate of bendiocarb

Ecological Characteristics

Avian acute toxicity: 3.1 mg/kg (mallard duck)
19 mg/kg (bobwhite quail)
Avian subacute toxicity: 477 ppm in the diet (mallard duck)
1770 ppm in the diety (bobwhite quail)
Avian reproduction: Reproductive impairment may occur when used on turf
Freshwater fish acute toxicity: 1.2-1.5 ppm (trout)
0.47-1.67 ppm (bluegill sunfish)
Freshwater invertebrates: 29.2 ppm (*Daphnia magna*)
Estuarine and marine organisms: Data not available
Honey bees: Highly toxic

Tolerance Assessment

Bendiocarb is not currently used on agricultural commodities. Therefore, no residue tolerances have been established for food crops, processed foods, or animals and animal byproducts.

No numerical food or feed additive tolerances have been established for residues of bendiocarb in food/feed resulting from its use in food handling and animal feed handling establishments. However, the prescribed conditions for use of bendiocarb in these sites are set out in 21 CFR 193.152 and 21 CFR 561.191.

No tolerances or exemptions from the requirement of tolerances have been established for residues of bendiocarb in or on agricultural commodities. Requests for tolerance are currently pending for a number of crops.

No tolerances or exemptions from the requirement of tolerances for bendiocarb residues in animal commodities exist. Animal metabolism and residue data submitted in support of proposed tolerances are currently under review; therefore,

no conclusions regarding the nature of the residue in animals will be made at this time.

No Canadian or Mexican tolerance or Codex MRL (Maximum Residue Levels) related to uses of bendiocarb in food handling establishments have been established.

4. Summary of Regulatory Positions and Rationales

--Bendiocarb will not be put into Special Review at this time. Potential risks to avian and aquatic species must be evaluated based on actual residue monitoring and field studies.

--Bendiocarb use on commercial turf is restricted to use by certified applicators due to avian and aquatic toxicity.

--Reentry intervals are not being established for turf and ornamental uses of bendiocarb.

--Endangered species labeling statements are required for the mosquito adulticide and turf uses

--Food additive tolerances are required for processed food and feed resulting from application in food/feed processing areas, and for residues resulting in food from use in shelf paper.

5. Summary of Outstanding Data Requirements

	Approximate Time Frame
Product Chemistry Data	6-15 months
Residue Chemistry Data	
171-4 - Residue analytical	48 months
171-4 - Storage stability data	48 months
171-4 - Magnitude of the Residue - Processed foods commercial food/feed handling estab.	12 months
Environmental Fate Studies	9-27 months
Reentry Data	
132-1 - Foliar Dissipation	27 months
Spray Drift Studies	12 months
Toxicology	
81-3 - Acute Inhalation - Rat	9 months
82-4 - 90-Day Inhalation - Rat	15 months
84-2 - Mutagenicity studies	9-12 months

Wildlife and Aquatic Organisms

70-1 -	Aquatic Residue Monitoring	48 months
71-5 -	Actual Field Testing for Mammals and Birds	48 months
72-3 -	Estuarine & Marine Organism Acute LC_{50}	12 months
72-4 -	Fish Early Life-Stage and Aquatic Invertebrate Life Cycle	15 months
72-6 -	Aquatic Organism Accumulation	12 months

Nontarget Insect

141-2 -	Honey bee - toxicity of residues on foliage	15 months

F. Contact Person

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